



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

**COASTAL RESOURCES MANAGEMENT COUNCIL**

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**ADDENDUM**

**TO**

**RHODE ISLAND'S SALT POND REGION:**

**A SPECIAL AREA MANAGEMENT PLAN**

**Coastal Resources Management Council**

QH  
541.5  
.S24  
R46  
1993  
addendum

**September 1993**

QH541.5.S24R46 1993 addendum

RHODE ISLAND'S SALT POND REGION:

A SPECIAL AREA MANAGEMENT PLAN

AMENDMENTS

These amendments to the Salt Pond Region Special Area Management Plan provide for the plan to be extended to Quonochontaug, Winnapaug and Maschaug Ponds and their watersheds. The amended Plan complements and adds to the policies, regulations and standards of the State of Rhode Island Coastal Resources Management Program as amended.

TITLE PAGE

Amend (Ninigret to Point Judith Ponds) to (Maschaug to Point Judith Ponds).

ACKNOWLEDGMENTS

- \* Second page, second paragraph. Amend the first two sentences as follows:

Special acknowledgment is due to the four towns in the Salt Pond region: Narragansett, South Kingstown, Charlestown and Westerly. Each of the town councils supported the project from the beginning and members of the commissions, boards and offices within each town gave generously of their time for development and implementation of this plan.

- \* Second page, last paragraph. Amend to read as follows:

Financial support for the Salt Pond study and the plan was provided by URI Sea Grant, the Rhode Island Coastal Resources Management Program, each of the four towns, and a planning grant from EPA through the Office of Statewide Planning.

CHAPTER ONE. THE OBJECTIVES OF THE SALT POND SPECIAL AREA MANAGEMENT PLAN

- \* Figure 1-1, page 3. Amend to portray housing trends for Quonochontaug, Winnapaug and Maschaug Ponds (See attached figure 1-1).
- \* Section 120, page 4. Last paragraph. Add a sentence prior to the last sentence as follows: Additional research and analyses were carried out during 1985 for the three Salt Ponds and their watersheds in the town of Westerly.
- \* Section 130, page 5. Second paragraph, third and fourth sentences. Amend as follows: For regulating purposes, the region is defined as shown in Figure 1-2 and 1-2A and includes 38 square miles. This region incorporates approximately 20 percent of Narragansett, 30 percent of South Kingstown, 40 percent of Charlestown, and 15 percent of Westerly.
- \* Section 130, page 5. Third paragraph, third sentence. Amend as follows: A recent survey indicates that some 60 percent of the residents of Narragansett, South Kingstown and Charlestown use the ponds as a recreational resource and that 70 percent of these users visit the ponds more than ten times a year.

- \* Section 130, page 5. Third paragraph, sixth sentence. Amend as follows:

The towns are considering increasing the size of house lots in the remaining scarcely developed areas, several parcels in the region are high on DEM's priority list for land acquisition, and the CRMC has designated all of the ponds, except for portions of Point Judith Harbor for conservation and low intensity use.

- \* Figure 1-2, page 6. Add a map incorporating the watershed boundaries of Quonochontaug, Winnapaug and Maschaug Ponds (see attached Figure 1-2 A).

- \* Section 140, page 7, goal 2, amend as follows:

To prevent expansion near areas of the salt ponds that are susceptible to contamination by potentially harmful bacteria or eutrophic conditions.

- \* Section 140, page 7, goal 2, second sentence. Amend as follows:

However, recent surveys of the ponds have shown that bacterial contamination is becoming more widespread.<sup>2.47</sup>

## CHAPTER TWO. THE FRAMEWORK OF MANAGEMENT

- \* Figure 2-1, page 14. Amend to reflect land use in the watersheds of Quonochontaug, Winnapaug and Maschaug Ponds (see attached Figure 2-A).

- \* Section 210.1, page 15, paragraph C. Omit the last sentence.

- \* Section 220.2 - CRMC Small Estuaries and Salt Ponds Subcommittee: (Effective July 26, 1988)

The CRMC's Planning and Procedure Subcommittee shall serve as the coordinator of planning and regulatory activities in the Salt Pond region and promote its legislative mandate that states "that preservation and restoration of ecological systems shall be the primary guiding principle upon which environmental alteration of coastal resources will be measured, judged and regulated (GLRI 46-23-1). The CRMC Planning and Procedures Subcommittee shall:

- A. Coordinate actions with local, state, regional and federal agencies and private interests; the Subcommittee shall act jointly with the Action Committee when implementing nonregulatory management initiatives contained in this plan (see 220.6 below).
- B. Make recommendations to the full Council, which shall serve as an arbitration board "in any matter of dispute involving the resources of the salt pond region and the interests of two or more municipal or state agencies" (GLRI 46-23-6Ce). The Subcommittee's recommendations shall be referred to the full Council for a binding decision.
- C. Sponsor research on management issues in the salt pond region and advise the Governor, General Assembly and public on coastal matters (GLRI 46-23-6Cc).

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- \* Section 270.4, page 18. Replace item 1, with the following:
  - 1. New residential or commercial developments of six dwelling units or more.
- \* Section 220.5 A, page 19. Agencies participating in the Coordinated Permit Review. Add:
  - 6. The fire districts, where appropriate, for an activity proposed for the watershed in which they are situated.
- \* Task 2.1, page 21. Municipal Governments. Change "the three municipalities in the region" to "the municipalities in the region..."

#### CHAPTER THREE. WATER QUALITY

- \* Section 310.2.A.2, page 26. Add a sentence to the end of the paragraph as follows:

The few bacteria samples that have been taken in Quonochontaug and Winnapaug Ponds indicate that water quality in these two ponds is still good, and safe for shellfishing.<sup>4.6</sup> Much of the northern shore and the watershed above these ponds is still largely undeveloped.
- \* Section 310.2.B.1, page 26. Amend the last two sentences of the paragraph to read as follows:

Trustom, Cards and Maschaug Ponds are host to dense flocks of waterfowl which are likely to be a major source of bacterial contamination. However, in Trustom Pond, since it is a National Fish and Wildlife Refuge, boating, swimming and shellfishing are prohibited.
- \* Section 310.2.B.2, page 26. Change "5,502 ISDS" to 7,600 ISDS to reflect the numbers of ISDS in the Quonochontaug, Winnapaug and Maschaug watershed.
- \* Figure 3-1, page 27. Add a map of the watershed boundaries of Maschaug, Winnapaug and Quonochontaug Ponds (see attached Figure 3-1B).
- \* Section 310.2 B.2, page 28. Add to the bottom of the table:

<u>Watershed</u>	<u>% Houses (1980) Built Before 1964</u>
Quonochontaug	50
Winnapaug and Maschaug	69

- \* Section 310.3, page 29, paragraph 2. Third sentence. Amend as follows:

Thus, nitrogen is limiting growth throughout most of the more saline Quonochontaug, Winnapaug, Ninigret and Point Judith Ponds, while both nitrogen and phosphorus limit growth in Green Hill, Potters, Trustom, Cards and Maschaug.<sup>20</sup>

- \* Section 310.3, page 32, B.4. Second sentence. Amend as follows:

These calculations (see Table 3-3) indicate that residential development accounts for more than 80 percent of the total nitrogen loadings to Winnapaug and Point Judith Ponds and more than 70 percent of the total nitrogen loadings to Potter, Green Hill, and Quonochontaug Ponds. <sup>11.48</sup>

- \* Table 3-3, page 33. Add the following to the top of the table:

<u>Watershed</u>	<u>Residential Use</u>	<u>Agricultural Use</u>	<u>Precipitation</u>
Maschaug	8,787 (93%)	241 (2%)	5,213 (24%)
Winnapaug	43,346 (86%)	2,516 (5%)	4,312 (9%)
Quonochontaug	15,449 (70%)	1,000 (5%)	433 (5%)

- \* Table 3-4, page 36. Add the following to the top of the table:

<u>Watershed</u>	<u>Houses in 1980</u>	<u>Houses Projected at Saturation</u>	<u>Increase Factor</u>
Maschaug	260	521	2.0
Winnapaug	1,509	3,526	2.3
Quonochontaug	625	1,999	3.2
Ninigret	1,228	4,816	3.9
Total Region	7,910	23,005	2.9

- \* Table 3-5, page 37. Add to the table:

<u>Source</u>	<u>Maschaug Pond</u>	<u>Winnapaug Pond</u>	<u>Quonochontaug Pond</u>
<u>Residential</u>			
Septic	8,596	58,179	28,995
Lawns	8,619	41,196	22,032
Pets	<u>704</u>	<u>4,964</u>	<u>2,478</u>
Total	17,919	104,339	53,505
<u>Agricultural</u>			
Fertilizers	0	0	0
Precipitation	433	4,312	5,213
Total Loading	18,352	108,381	58,718

- \* Section 320, page 42. Add a map of land use classification for water quality protection in the watersheds of Maschaug, Winnapaug and Quonochontaug Ponds (see attached Figure 3-7A).

- \* Figure 3-10, page 47. Add a map indicating direct discharges of stormwater runoff from roads and highways to Quonochontaug, Winnapaug and Maschaug Ponds (see attached Figure 3-10B).

- \* **Section 320.1: (Effective February 13, 1990)**

An Area located in the Watch Hill USGS Quadrangle in Westerly, Rhode Island; bounded to the north by Shore Road, to the west by Weekapaug Road, known as Assessors Plats 132, 143, Lots 89, 89A through N. This area is currently subject to the Land Use Classification for Water Quality Protection designation of "Lands Already Developed Beyond Carrying Capacity"; the revision is to redesignate this area as "Lands of Critical Concern".

- \* **Section 320.1.A.2.a & b (Effective November 28, 1989)**

- a) In order to be in conformance with this plan, subdivisions (as defined in Section 320 of the Coastal Resources Management Plan) shall not exceed a density of 1 residential unit per 80,000 square feet. For the purposes of this section, the allowable number of units in conformance with this standard shall be calculated on the basis of available land suitable for development. Land suitable for development shall be defined as the net total acreage of the parcel, lot or tract remaining after exclusion of the areas containing, or on which occur the following protected resources: Coastal features as defined within Chapter 46-23 GLRI and/or the Coastal Resources Management Program Section 210; freshwater wetlands as defined in Chapter 2-1 GLRI, and/or any rules or regulations of the Department of Environmental Management, as promulgated thereunder. The division of a tract, lot or parcel not subject to municipal regulation under the provision of Chapter 45-23-1, for the reasons set forth therein, shall remain subject to the jurisdiction of the requirements of Chapter 46-23, the CRMP and this section.
- b) Cluster development is recommended as a means to preserve open space, aesthetic qualities, and agricultural lands, reduce the costs of development, and minimize the environmental impacts of development. For CRMC purposes, the number of units in a cluster shall be calculated on the basis of developable land within the subdivision in accordance with all local ordinances, and as defined in (a) above. Lands included within statutory setbacks from freshwater wetlands as defined in Chapter 2-1 GLRI or any rules and regulations of the Department of Environmental Management, as promulgated thereunder, and lands to be developed as streets and roads shall also be excluded from the calculated acreage of developable land. The density of the cluster development shall not exceed the standard established in (a) above.

- \* **Section 320.1.B.3.: (Effective June 21, 1987)**

The definition and regulations pertaining to areas of critical concern apply to those properties platted after the adoption date of this plan. Alterations, to coastal features or within 200 feet of a coastal feature on properties platted prior to the adoption of this plan will, where possible, conform to the regulations of this section.

In cases where, due to the size or configuration of a lot that was platted prior to the adoption of this plan it is not possible to provide a 200 foot buffer, then the determination of the boundaries of a buffer zone must balance the property owner's rights to enjoy their property with Council's responsibility to preserve, and where possible, restore ecological systems. Recommended buffer zone shall be established according to the environmental values and sensitivities of the site as assessed by the Council's staff engineers and biologists.

**Section 320.2.B Denitrification of Domestic Sewage (adopted 7-13-93)**

**Delete Section 320.2.B.1**

Add new Section 320.2.B.1 as follows: 1. Definitions. Nitrogen reducing individual sewage disposal systems (ISDSs) are defined as any system which removed nitrogenous waste through incineration, composting, or denitrification. A nitrogen reduction ISDS which removes nitrogenous waste through incineration or composting is defined as any system which removes the black water component of the system. A denitrification ISDS is defined as any system which removes at least 50% of the total nitrogen loadings as measured on an average annual basis at a point which is at the outlet septic tank. The RIDEM shall be the agency which determines whether any proposed nitrogen reducing ISDS satisfies these requirements.

**Delete Section 320.2.B.2**

Add new Section 320.2.B.2 as follows: 2. Management Policies and Regulations

(a) In order to reduce nitrogen loadings to ground water and improve the water quality and to mitigate future water quality impacts to the Salt Ponds, the Council shall require all new structures and structures undergoing significant alterations located in the areas defined in figure 3-11 (areas adjacent to Green Hill Pond and the eastern part of Ninigret Pond), to install a nitrogen reducing ISDS in accordance with all applicable standards and requirements of the RIDEM and the CRMC.

(b) The Council may also require the installation of a nitrogen reducing ISDS in any area mapped as a Lands of Critical Concern (Section 320.1.B) Lands Already Developed Above Carrying Capacity (Section 320.1.C), and Undeveloped Lands Zoned for High Density (Section 320.1.D) if a nitrogen reducing ISDS has been required by the RIDEM or a local municipality. In addition, the Council may require the installation of a nitrogen reducing ISDS in any of these areas in order to mitigate future water quality impacts if there is sufficient evidence to demonstrate that the cumulative impacts of this pollutant will lead to further water quality degradation in the Salt Ponds.

\* Section 320.2.F, page 49. Add the following:

4. Quonochontaug Pond. Every effort should be made to deflect an offshore oil spill from the breachway of the pond, and toward the

ocean beaches. The fast currents in the breachway and the boulders off the mouth make it a difficult place to deploy booms. If oil cannot be kept out of the breachway, containment booms and mops may be deployed in the dogleg of the breach or where the breachway empties into the pond and currents start to dissipate. Oil should be deflected toward the tidal creeks in nearby salt marshes instead of being allowed to spread throughout the pond. Launching facilities for small boats and access for heavy equipment are available on the eastern side of the breachway.

5. Winnapaug Pond. Every effort should be made to deflect an offshore oil spill from the breachway of the pond, and toward the ocean beaches. The fast currents in the breachway (4 knots) make it a difficult place to deploy booms for containment and cleanup. If oil cannot be kept out of the breachway, efforts should be made to use booms or barriers to protect the large salt marsh along the pond's southern shoreline and to prevent the oil from spreading westward into the large basin of the pond.

#### CHAPTER FOUR. BREACHWAYS, EROSION AND SEDIMENTATION

\* Section 420. p. 66. Add the following:

##### 420.3 Breachways and Dredging in Trustom, Cards and Maschaug Ponds.

- C. It is compatible with this plan to manage the pond level and to remove excess stormwater from Maschaug Pond in a manner which does not threaten the stability of the beach.

##### 420.4 Breachways and Dredging in Quonochontaug Pond.

- A. Dredging should be limited to habitat restoration and enhancement.
- B. Dredging a sediment catch basin on the northern end of the breachway may become necessary to halt the flow of sand into the pond for habitat improvement. Dredging projects may be undertaken only after an evaluation of the impacts has been made by a competent coastal geologist and it is demonstrated that the project conforms to the objectives of this plan.
- C. Dredged sand shall be used to nourish Quonochontaug barrier beach and shall be placed on the beach according to the configuration shown in Figure 4-4.

##### 420.5 Breachways and Dredging in Winnapaug Pond.

- A. A narrow channel may be maintained as the main channel from the northern end of the breachway through the terminal lobe of the flood tidal delta. Natural sedimentation processes should be allowed to continue elsewhere on the tidal delta. Other channels should not be opened which would increase sedimentation inside the pond.



- B. Dredging in the pond basin shall be limited to habitat improvement and restoration. Sand may be dredged from storm surge platforms and used for beach nourishment. Dredged sand must be placed on the beach face in conformance with Figure 4-4.
- C. Dredging projects may be undertaken only after an evaluation of the impacts has been made by a competent coastal geologist and it is demonstrated that the project conforms to the objectives of this plan.

#### 420.6 Beach Restoration

- A. Mechanical removal or redistribution of sand from the intertidal zone of the beach to increase the profile of the beach scarp or to construct artificial dunes is prohibited. Such practices destabilize the beach, increase erosion along the beach and eventually increase sedimentation in the ponds.
- B. Sand used for beach nourishment projects shall be placed on the beach in conformance with Figure 4-4 and in consultation with a competent coastal geologist.

#### CHAPTER FIVE. FISH AND FISHERIES

No amendments are proposed.

#### CHAPTER SIX. STORM HAZARDS

- \* Section 610.1.C, page 84. Second sentence. Change all three of the region's towns to all four of the region's towns.
- \* Section 610.2.A, page 84. Change 2,000 houses and 6,000 residents to 3,200 houses and 9,600 residents.
- \* Figure 6.1, page 85. Add Figure 6-2. Zones of severe flood hazard as designated by the Federal Emergency Management Agency for Quonochontaug, Winnapaug and Maschaug Ponds (see attached Figure 6-2).
- \* Section 610, page 88. Add the following:

#### 610.6. Findings of Fact for Winnapaug and Maschaug Ponds

1. Due to the low elevation of the land around these ponds, the sand starved, erosional nature of the coastline and the dense development of both residential and commercial structures on the land surrounding these two ponds, they are particularly vulnerable to coastal flooding. Recently updated FEMA flood maps clearly<sup>6</sup> show how extensive the highest hazard flood zones are. (Figure 6-2)
2. Of the many hurricanes that have hit Rhode Island's coast, comparative damage estimates were made for only the two most recent major ones and in each case, the Misquamicut/Winnapaug area sustained

heavy damages, more than anywhere else along the south shore. Many lives were lost and property damages were excessive in the hurricane of 1938. The area was rebuilt and destroyed again in 1954 during Hurricane Carol. In less than half an hour's time, the storm-surge reduced 200 cottages, inns and businesses to rubble. Although no lives were lost, property damage was estimated to have been several million. Damages were increased by high contents of sewage and petroleum in flood waters.

3. Natural and man-made debris will be a serious problem in the next hurricane. During the hurricanes of 1938 and 1954, pieces of houses which had been on the barrier and on the Misquamicut headland, were washed across the ponds or swept through neighborhoods and acted as battering rams on houses which would have otherwise stayed intact. Much of the wreckage from Misquamicut was swept by flood waters across a mile of field and deposited at the base of Shore Road. It took weeks for emergency crews to haul away the rubble. In 1938 fallen trees delayed access to the shore after the storm. On Atlantic Avenue, where sand swept from the beaches piled on the road burying the cars, cleanup crews worked for days with heavy machinery to make the road suitable for public access.
4. Cleanup after the next major hurricane will be a much more costly operation than it was in the past. Development has more than doubled since 1954 in the flood hazard zones around these ponds. Much of the new construction is on the barrier beach. When the structures are broken and hurled along by storm waves, they batter structures further inland. This includes so-called "breakaway walls" which have been shown to cause damage to other structures during severe storms, including winter storms and hurricanes. More public utilities have been built in high flood danger zones in recent years adding greatly to the cost of reconstruction. In addition to roads and power lines, there are now water mains, cable TV lines and phone lines that cross the barrier in places where surge channels broke through in past hurricanes.
5. Construction along the shore in Weekapaug and Misquamicut is more vulnerable than before to erosion. The Misquamicut headland and western end of the barrier have been eroding at an average rate of 2 feet per year since 1940<sup>8</sup>, and the structures in these areas are therefore more vulnerable to the extreme erosion that accompanies a hurricane. During the hurricane of 1938 the high cliff at Watch Hill receded some 35 feet and the large dunes at Weekapaug receded 50 feet all within a few hours.<sup>1</sup> With the exception of the eastern end of the barrier, most of the shore and the barrier spit are much lower than the predicted wave heights of another hurricane the magnitude of 1938 or Hurricane Carol, and so provide little protection to communities on Misquamicut or around the pond shore. The height of the dune crest by little Maschaug Pond is only 8 feet mean sea level. The hurricane storm surge is predicted to be 15 to 18 feet above mean sea level along the Misquamicut headland and Atlantic Avenue.

6. As in the past the next hurricane can be expected to bring major changes to the pond. Sand will be washed over the barrier into the pond, old breachways may close and new ones form. Surge channels will cut through the beach and the inlet that formed cutting through Misquamicut Beach in the last two hurricanes can be expected to do so again. Hurricane-driven waves and currents are major forces for carrying sediment and creating shoals farther in the ponds.

#### 610.7. Findings of Fact for Quonochontaug Pond

1. Quonochontaug Pond is separated from the waters of Block Island Sound by a barrier spit stretching between the headlands of Weekapaug Pond and Quonochontaug Neck. The pond and the low lands around it are very susceptible to coastal flooding (Figure 6-2).
2. There has been a long history of damage to lives and property due to coastal flooding from hurricanes. In the hurricane of 1938 and again in 1954 substantial houses, roads, and power lines were demolished as the storm surge swept across the barrier and headlands, depositing tons of debris in the fields along the northern shore of the pond. In 1938 and again in 1954 approximately a million dollars of damage was done to construction in the high hazard zones around this pond. (See Figure 6-2).
3. In recognition of the importance of a healthy barrier, a civic group of private citizens have purchased the barrier, have restricted development, and are actively managing it to promote rebuilding of the dunes. Still, the barrier is sand starved and susceptible to future storm damage. In the years since 1930, the west end of the barrier has been eroding at an average rate of about two feet per year. Predicted flood heights for a hurricane like 1938 Hurricane Carol exceed the height of existing dunes. Dune heights on the western end of the barrier range from 8.9 to 17.3 feet above mean sea level; and 22 feet on the west end; yet hurricane flood heights are expected to reach 15 to 18 feet above mean sea level on the east end and 23 feet above mean sea level on the west end.

\* Section 620.1. p. 89. Construction Standards in Flood Zones.

Amend regulation No. 8 for construction in V Zones to read as follows:

8. The space below the lowest floor and between pilings shall be kept free of obstruction. Break away walls are prohibited in V Zones. The space below the lowest floor shall not be used for human habitation, utility items or permanent storage.

\* Section 620.2.B, p. 91. Add:

New inlet channels cut across the beach to Quonochontaug, Winnapaug or Maschaug Ponds may be immediately filled in with sand or gravel by the local municipality.

\* Section 620.2.D, p. 91. Add: and Misquamicut State Beach.

CHAPTER SEVEN. INTENSIFYING USE

No amendments are proposed.

REFERENCES

\* Page 109

47. Biweekly bacteria data for the salt ponds, 1985-1986. Pond Watcher report to the CRMC and DEM.

48. Collins, C. 1985. A water quality element for the extension of the Salt Pond Special Area Management Plan to Quonochontaug, Winnapaug, and Maschaug Ponds. M.S. Thesis. Geography and Marine Affairs, URI, Kingston, R.I. 53 pp.

\* Page 110

17. Boothroyd, J.C., Dacy, M. Rosenberg, M. 1985. A geological survey of sedimentation in Quonochontaug, Winnapaug and Maschaug Ponds. Report to CRMC and the town of Westerly. Geology Dept., URI.

\* Page 112. 6. line 2.

Maps for the towns of Charlestown, South Kingstown, Narragansett and Westerly.

/jmm

- Figure 1-2 A. The Western portion of the Salt Pond Region. For administrative purposes, the boundaries of the Salt Pond Region follow the roadways that most closely correspond to the watershed boundaries of the salt ponds. The region is bounded on the south by Block Island Sound, on the north by Rte. 1 and Rte. 1A, on the east by East Beach Road, and on the west by Montego Road.
- Figure 1-1. The increase of residential development within the salt pond watersheds south of Route 1.
- Figure 2.1. Land use in the salt pond region. A large proportion of the watersheds is in private ownership and is as yet undeveloped.
- Figure 3-1 B. Watershed boundary for Quonochontaug, Winnapaug and Maschaug Ponds. Groundwater flows south from the dashed lines to the salt ponds where it surfaces and mixes with the sea water in ponds.
- Figure 3-7 A. Land use classification for water quality protection in the towns of Westerly and Charlestown.
- Figure 3-10 B. Direct Discharges of Stormwater Runoff from Roads and Highways in the Salt Pond Region.
- Figure 6-2 Zones of Severe Flood Hazard. Adopted from Federal Emergency Management Agency Maps. Prepared for the Region in 1984.

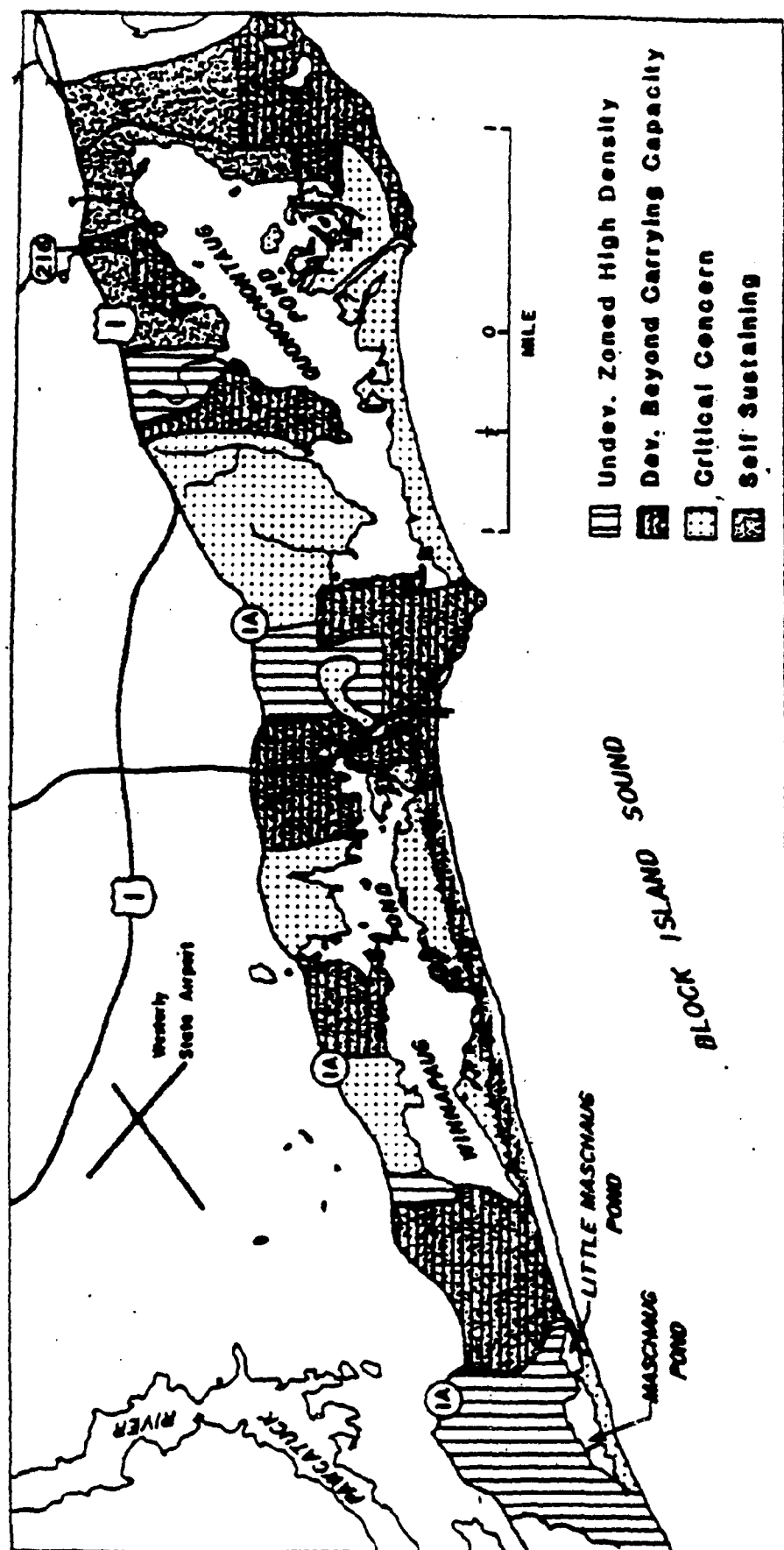


Figure 3-7 A. Land use classification for water quality protection in the Towns of Westerly and Charlestown.

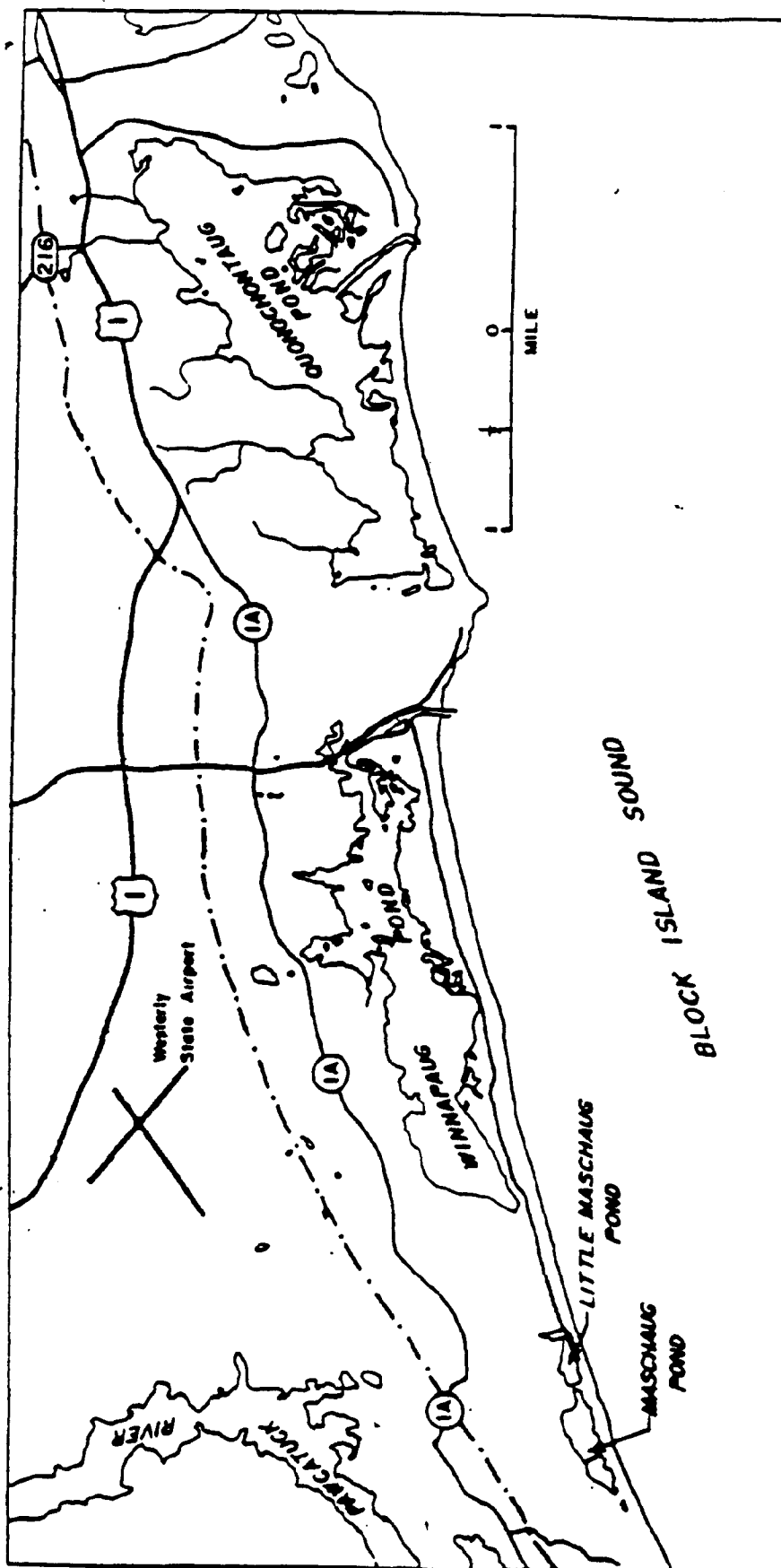


Figure 3-1B. Watershed boundary for Quonochontaug, Winnapaug and Maschaug Ponds. Groundwater flows south from the dashed lines to the salt ponds where it surfaces and mixes with the sea water in ponds.

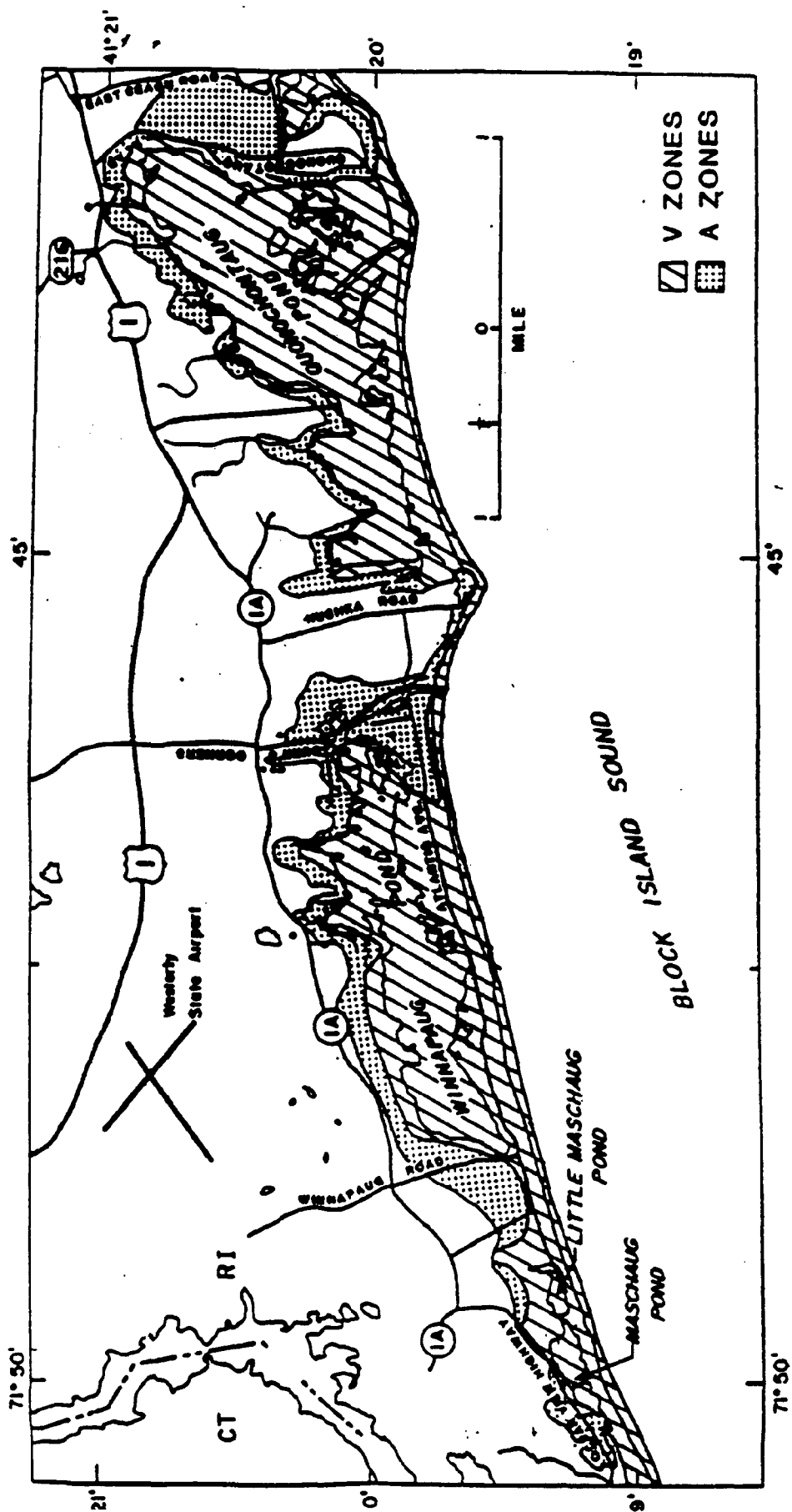


Figure 6-2. Zones of Severe Flood Hazard. Adopted from Federal Emergency Management Agency Maps. Prepared for the Region in 1984.



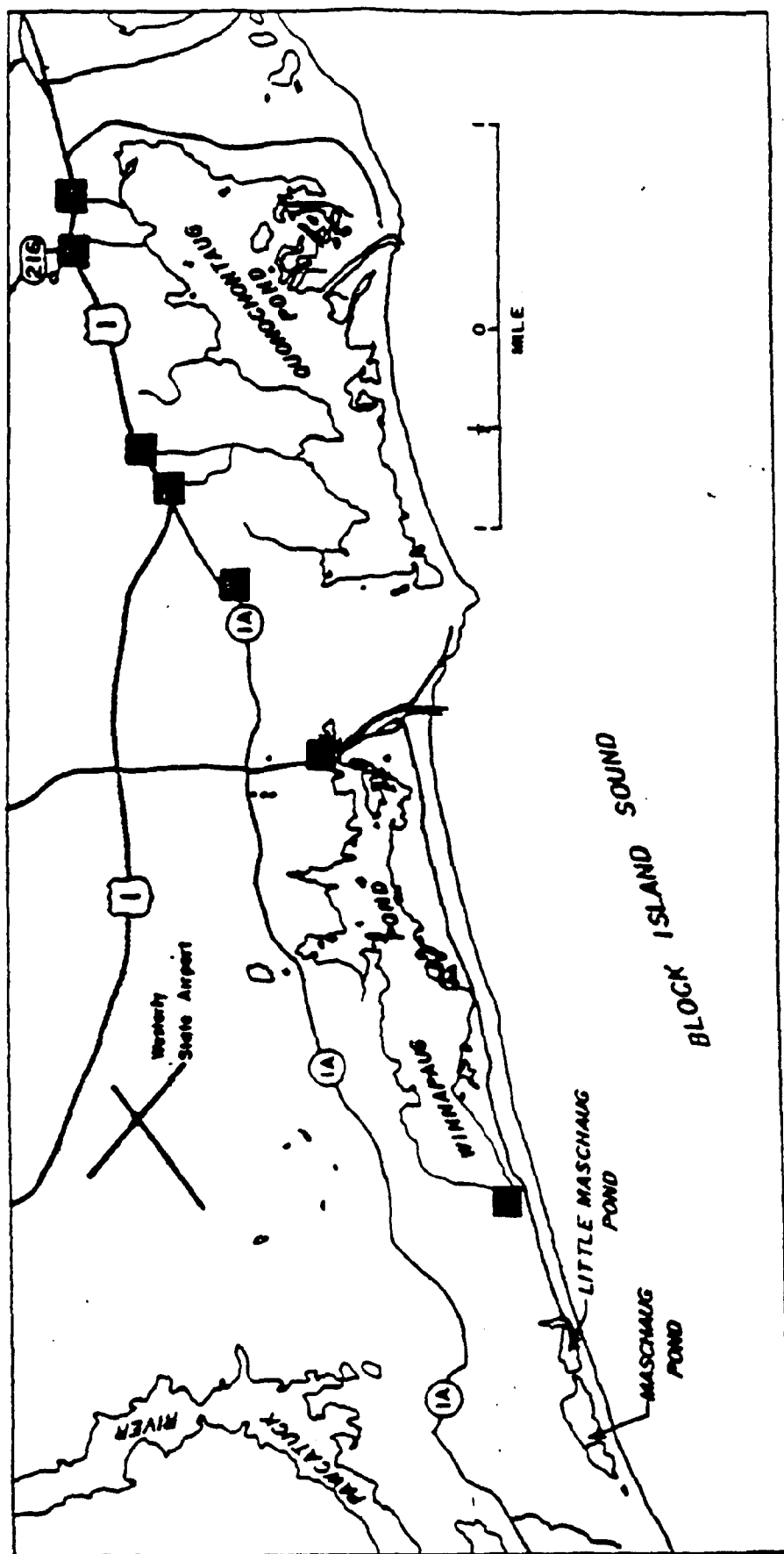


Figure 3-10 B. Direct Discharges of Stormwater Runoff From Roads and Highways in the Salt Pond Region.

Figure 3-11

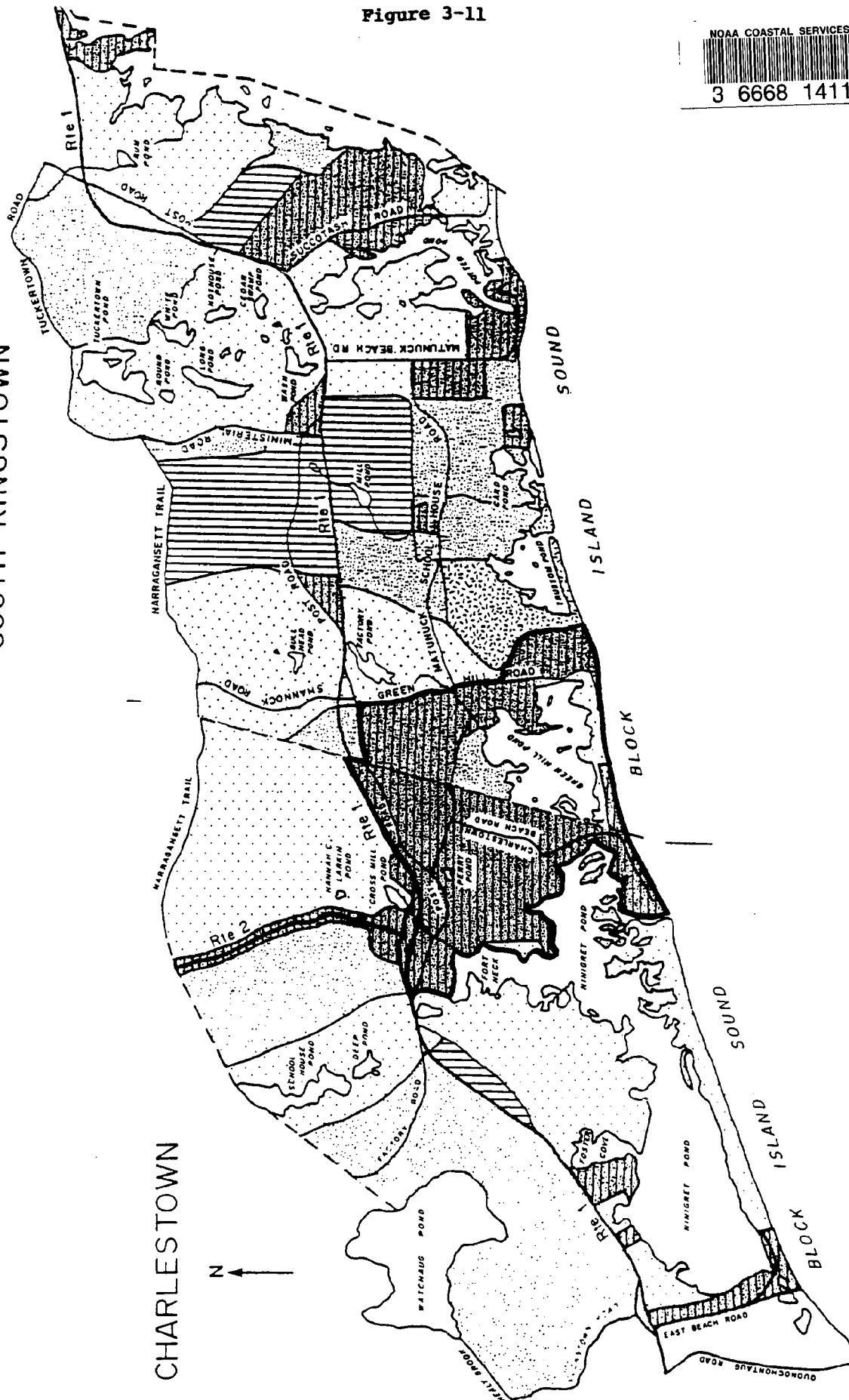
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SOUTH KINGSTOWN

CHARLESTOWN



- Developed Beyond Carrying Capacity
- Undeveloped Zoned High Density
- Self-Sustaining
- Critical Concern